



Technical Information

Series 45 H Frame

Contents
Frame H

Design	4
Specifications	5
Performance H57B	6
Performance H75D	7
Order code	8
Controls	10
Pressure compensated control (PC)	10
Load sensing control (LS)	10
Load sensing control with internal bleed orifice (LB)	11
Input shafts	12
Auxiliary mounting pads	15
SAE-A auxiliary mounting pad	15
SAE-B auxiliary mounting pad	15
Displacement limiters	16
SAE-C auxiliary mounting pad	16
Installation drawings	17
Adjustable displacement limiter	17
SAE-C mounting flange, axial ported endcap	18
SAE-C mounting flange, radial ported endcap	20
SAE-B mounting flange, axial ported endcap	22
SAE-B mounting flange, radial ported endcap	24

Technical Information**Series 45 H Frame Pumps**

General Information

This information was removed from:
[Series 45 Axial Piston Open Circuit Pumps Technical Information Manual](#) **520L0519**
Rev E November 2006

For more information regarding the Series 45 product line refer to the current version of **520L0519**.

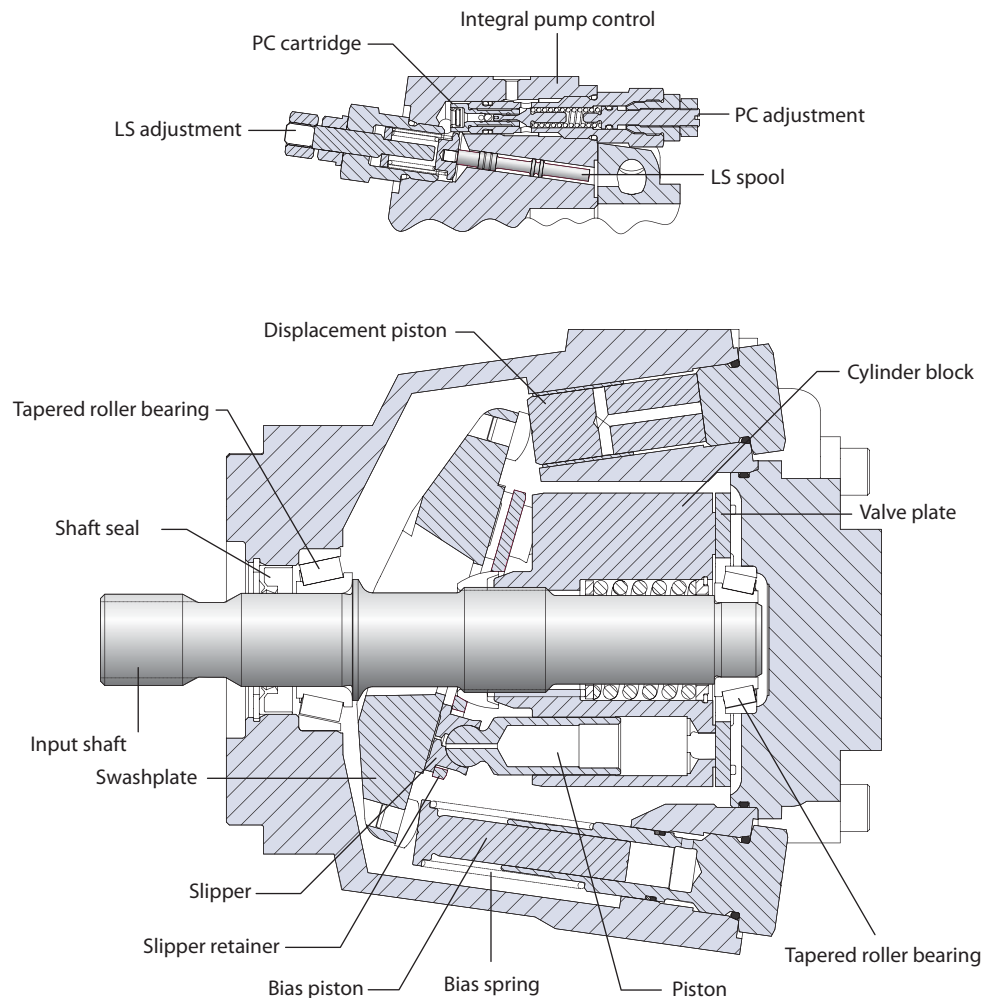
Frame H

Design

Series 45 Frame H pumps have a dual servo piston design with a cradle-type swashplate set in polymer-coated journal bearings. The bias piston increases swashplate angle. The displacement piston decreases swashplate angle. At equal pressure, the larger diameter displacement piston overpowers the bias piston. Nine reciprocating pistons displace fluid from the pump inlet to the pump outlet as the cylinder block rotates on the pump input shaft. The block spring holds the piston slippers to the swashplate via the slipper retainer. The cylinder block rides on a bi-metal valve plate optimized for high volumetric efficiency and low noise. Tapered roller bearings support the input shaft and a viton lip-seal protects against shaft leaks.

An integral, adjustable, two-stage control senses system pressure (PC and LS controls) and load pressure (LS only). The pump control ports system pressure to the displacement piston to control pump output flow.

Frame H cross section



P101 984E

Technical Information

Series 45 H Frame Pumps

Specifications

For general operating parameters, including fluid viscosity, temperature, and inlet and case pressures, [see page 14](#). For system design parameters, including installation, filtration, reservoir, and line velocities, [see page 16](#).

Features and options

		Model	
Feature	Unit	H57B	H75D
Maximum Displacement	cm ³ [in ³]	57 [3.48]	75 [4.58]
Flow at rated speed (theoretical)	l/min [US gal/min]	148.2 [39.2]	180 [47.5]
Input torque at maximum displacement (theoretical)	N·m/bar [lbf·in/1000 psi]	0.907 [554]	1.194 [729]
Mass moment of inertia of internal rotating components	kg·m ² [slug·ft ²]	0.00430 [0.00318]	0.00420 [0.00310]
Weight	Axial ports	24 [53]	
	Radial ports	27 [60]	
Rotation		Clockwise, Counterclockwise	
Mounting		SAE-B, SAE-C	
Auxiliary mounting (See page 51)		SAE-A, SAE-B, SAE-BB, SAE-C	
System ports (type)		SAE O-ring boss, 4-bolt split flange	
System ports (location)		Axial, Radial	
Control types (See page 46)		PC, LS, LS with internal bleed	
Shafts (See page 48)	Splined	13 tooth, 14 tooth, 15 tooth	
	Tapered	Ø 31.75 mm [1.25 in], 1:8 taper	
	Straight	Ø 31.75 mm [1.25 in]	
Displacement limiters (See page 52)		Optional, adjustable	

For definitions of pressure and speed ratings, [see page 15](#). For more information on external shaft loads, [see page 17](#); mounting flange loads, [see page 18](#).

Ratings

		Model	
Rating	Units	H57B	H75D
Input speed ¹	minimum	500	500
	continuous	2600	2400
	maximum	3200	2800
Working pressure	continuous	310 [4495]	210 [3045]
	maximum	400 [5800]	300 [4350]
External shaft loads	External moment (M _e)	226 [2000]	226 [2000]
	Thrust in (T _{in}), out (T _{out})	2200 [495]	2200 [495]
Bearing life	at 140 bar [2030 psi]	29 712	10 755
	at 210 bar [3045 psi]	6834	2474
	at 260 bar [3770 psi]	3151	—
	at 310 bar [4495 psi]	1666	—
Mounting flange load moments	Vibratory (continuous)	SAE-C: 1500 [14 000], SAE-B: 735 [6500]	
	Shock (max)	SAE-C: 5650 [50 000], SAE-B: 2600 [23 000]	

1. Input speeds are valid at 1 bar absolute [0 in Hg vac] inlet pressure. See [Inlet pressure vs. speed](#) charts.

Sound levels²

dB(A)	210 bar [3045 psi]		260 bar [3770 psi]		310 bar [4495 psi]	
Model	1800 min ⁻¹ (rpm)	Rated speed	1800 min ⁻¹ (rpm)	Rated speed	1800 min ⁻¹ (rpm)	Rated speed
H57B	69	72	70	73	71	74
H75D	71	74	—	—	—	—

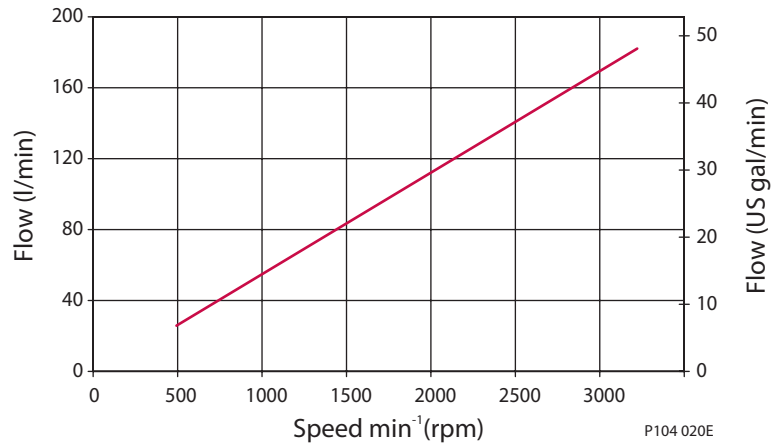
2. Sound data was collected in a *semi-anechoic* chamber. Values have been adjusted (-3 dB) to reflect *anechoic* levels.

For more information on noise levels, [see page 20](#).

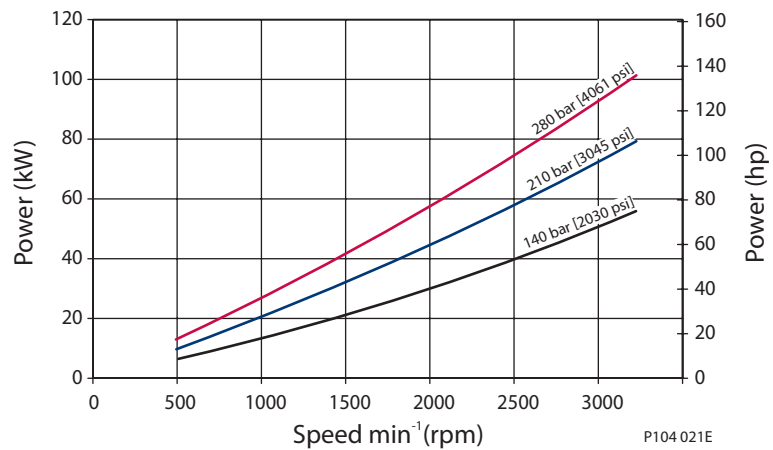
**Performance
H57B**

Flow and power data valid at 49°C [120°F] and viscosity of 17.8 mm²/sec [88 SUS].

Flow vs. speed

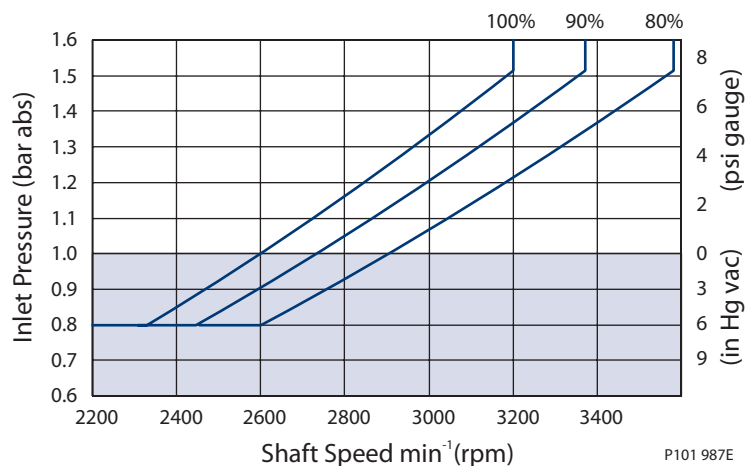


Input power vs. speed



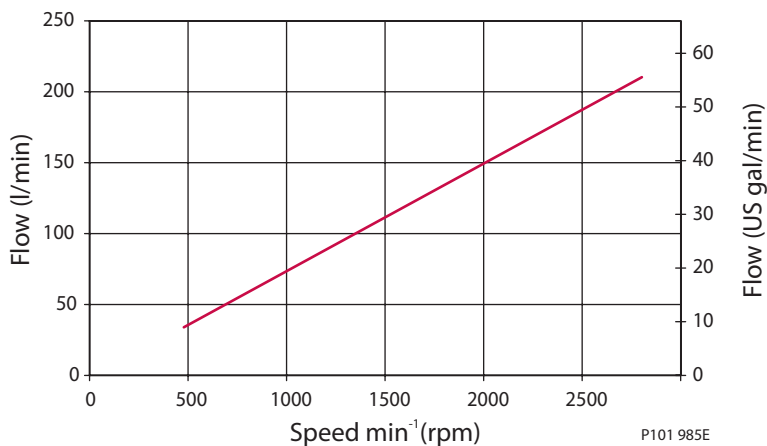
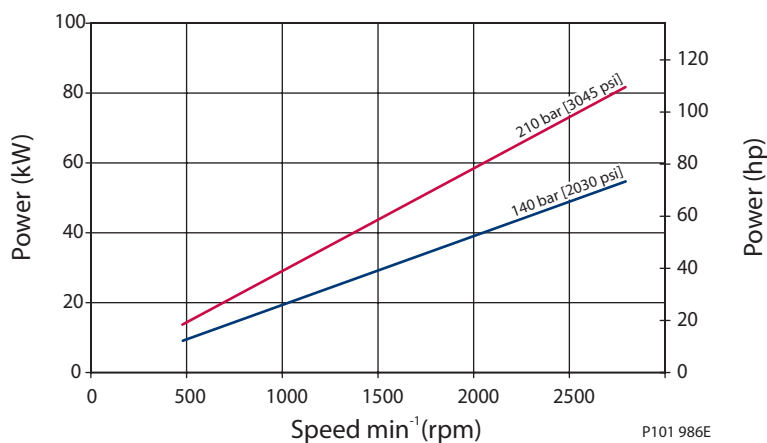
The chart on the right shows allowable inlet pressure and speed at various displacements. Greater speeds and lower inlet pressures are possible at reduced displacement. Operating outside of acceptable limits reduces pump life.

Inlet pressure vs. speed

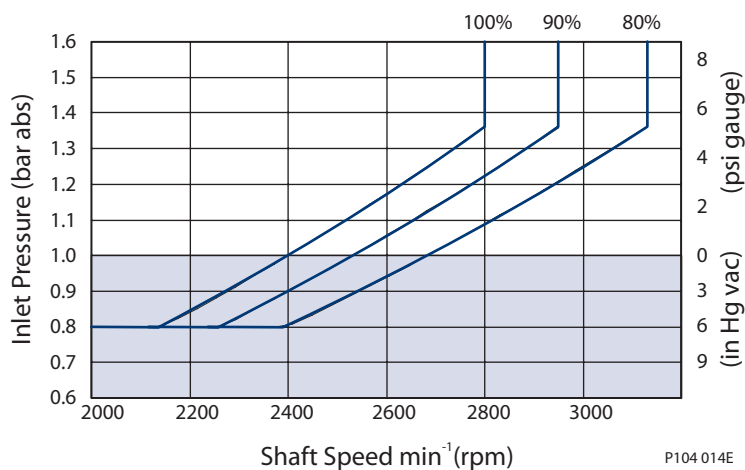


**Performance
H75D**

Flow and power data valid at
49°C [120°F] and viscosity of
17.8 mm²/sec [88 SUS].

Flow vs. speed

Input power vs. speed

Inlet pressure vs. speed

The chart on the right shows allowable inlet pressure and speed at various displacements. Greater speeds and lower inlet pressures are possible at reduced displacement. Operating outside of acceptable limits reduces pump life.



Order Code

R S P C D E F G H $\begin{array}{c} J \\ \hline 1 \ 2 \ 3 \end{array}$ $\begin{array}{c} K \\ \hline 1 \ 2 \ 3 \end{array}$ L M N

R Product

HR	H Frame, variable displacement open circuit pump
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S Rotation

L	Left hand (counterclockwise)
R	Right hand (clockwise)

P Displacement and pressure rating

057B	057 cm³/rev [3.48 in³/rev], 310 bar [4495 psi] continuous working pressure
075D	075 cm³/rev [4.58 in³/rev], 210 bar [3045 psi] continuous working pressure

C Control type

PC	Pressure compensated control
LS	Load sensing / pressure compensating control
LB	Load sensing / pressure compensating control with internal bleed orifice

D PC setting (2 digit code, 10 bar increments)

Example	10 = 100 bar
10-31	100 to 310 bar [1450 to 4495 psi] (057B)
10-21	100 to 210 bar [1450 to 3045 psi] (075D)

E Load sensing setting (2 digit code, 1 bar increments)

Example	20 = 20 bar
10–35	10 to 35 bar [145 to 508 psi]
NN	Not applicable (use with PC controls)

F *Not used*

NN	Not applicable
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G *Pilot orifice*

N	None (standard for PC control)
A	Ø 0.8 mm [0.031 in] (standard with LS and LB controls)

H Gain orifice

3	Standard orifice
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Technical Information

Series 45 H Frame Pumps

Order Code (continued)

R S P C D E F G H J
1 2 3 K
1 2 3 L M N

J1 Input shaft

SAE-C mounting flange pumps (housing code K2=1)	
S1	14 tooth, 12/24 pitch (ANSI B92.1 1970 - Class 5)
T0	Ø 31.75 mm [1.25 in], 1:8 taper
K4	Ø 31.75 mm [1.25 in], straight keyed
C2	13 tooth, 16/32 pitch (ANSI B92.1 1970 - Class 5)
C3	15 tooth, 16/32 pitch (ANSI B92.1 1970 - Class 5)
SAE-B mounting flange pumps (housing code K2=6)	
L4	Ø 31.75 mm [1.25 in], straight keyed
D2	13 tooth, 16/32 pitch (ANSI B92.1 1970 - Class 5)
D3	15 tooth, 16/32 pitch (ANSI B92.1 1970 - Class 5)

J2 Auxiliary mounting flange

N	None
A	SAE-A, 9-tooth coupling
T	SAE-A, 11-tooth coupling
B	SAE-B, 13-tooth coupling
V	SAE-BB, 15-tooth coupling
C	SAE-C, 14-tooth coupling

J3 System port size and location

Code	Location	Port type	Inlet size	Outlet size
2	Radial	4-bolt split-flange	2 in.	1 in.
4	Axial	4-bolt split-flange	2 in.	1 in.
3	Axial	SAE O-ring boss	1 7/8 in.	1 5/16 in.

K1 Shaft seal

A	Single lip seal, viton
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K2 Mounting flange and housing port style

1	SAE-C 4-bolt, SAE O-ring boss housing ports
6	SAE-B 2-bolt, SAE O-ring boss housing ports

K3 Not used

N	Not applicable
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L Displacement limiter

NNN	None
AAA	Adjustable, factory set at max angle
Axx	Adjustable, factory set at xx% of maximum displacement (5% increments), Example: A90=90%

M Special hardware

NNN	None
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N Special features

NNN	None
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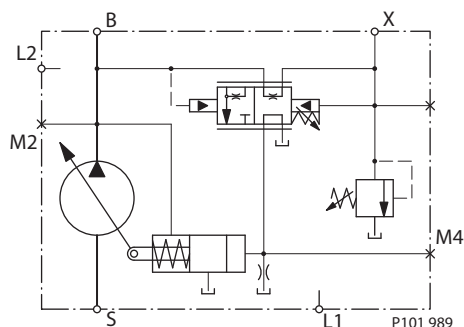
Controls
Pressure compensated control (PC)
Specifications
PC control setting range

Model	bar	psi
H57B	100–310	1450–4495
H75D	100–210	1450–3045

*Response/recovery times**

(ms)	Response	Recovery
H57B	30	125
H75D	30	130

* For definitions, [see page 11](#).

Schematic diagram PC schematic

Legend

B = Outlet
 S = Inlet
 L1, L2 = Case drain
 M2 = System pressure gauge port
 M4 = Servo pressure gauge port
 X = Not used

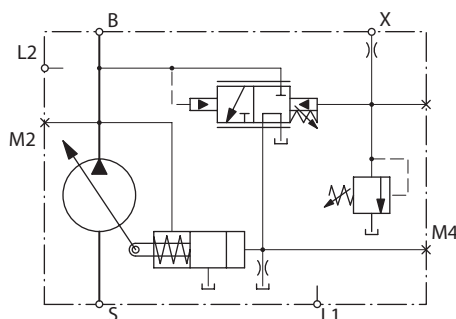
Load sensing control (LS)
Specifications
PC setting range

Model	bar	psi
H57B	100–310	1450–4495
H75D	100–210	1450–3045

*Response/recovery times**

(ms)	Response	Recovery
H57B	30	90
H75D	30	95

* For definitions, [see page 13](#).

Schematic diagram LS Schematic

LS setting range

Model	bar	psi
All	10–35	145–508

Legend

B = Outlet
 S = Inlet
 L1, L2 = Case drain
 M2 = System pressure gauge port
 M4 = Servo pressure gauge port
 X = LS signal port

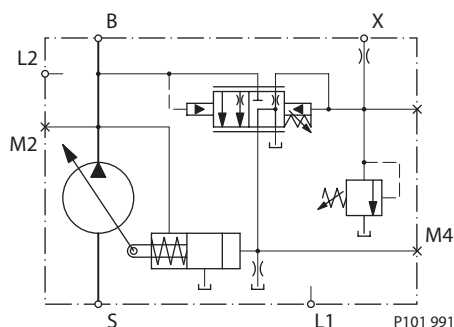
**Controls
(continued)**
Specifications **Load sensing control with internal bleed orifice (LB)**
PC setting range

Model	bar	psi
H57B	100–310	1450–4495
H75D	100–210	1450–3045

*Response/recovery times**

(ms)	Response	Recovery
H57B	30	90
H75D	30	95

* For definitions, [see page 13](#).

Schematic diagram **LS Schematic**

LS setting range

Model	bar	psi
All	10–35	145–508

Legend

- B = Outlet
- S = Inlet
- L1, L2 = Case drain
- M2 = System pressure gauge port
- M4 = Servo pressure gauge port
- X = LS signal port

Input Shafts
Shaft data

Code	Description	Availability		Torque rating ¹		Drawing
		SAE-C flange	SAE-B flange	Continuous N•m [lbf•in]	Maximum N•m [lbf•in]	
S1	14 tooth spline 12/24 pitch (ANSI B92.1 1970 - Class 5)	●	—	283 [2500]	734 [6495]	
T0	Ø 31.75 mm [1.25 in] 1:8 taper (SAE J501)	●	—	N/A	734 [6495]	
K4	Ø 31.75 mm [1.25 in] Straight keyed	●	—	N/A	655 [5797]	

1. See [Input shaft torque ratings](#), page 19 for definitions of continuous and maximum torque.

input Shafts
(continued)

Code	Description	Availability		Torque rating ¹		Drawing
		SAE-C flange	SAE-B flange	Continuous N·m [lbf·in]	Maximum N·m [lbf·in]	
C2	13-tooth 16/32 pitch (ANSI B92.1 1970 - Class 5)	●	—	102 [900]	282 [2495]	
C3	15-tooth 16/32 pitch (ANSI B92.1 1970 - Class 5)	●	—	192 [1700]	362 [3200]	
L4	Ø 31.75 mm [1.25 in] Straight keyed	—	●	N/A	655 [5800]	

1. See [Input shaft torque ratings](#), page 19 for definitions of continuous and maximum torque.

Technical Information Series 45 H Frame Pumps

**input Shafts
(continued)**

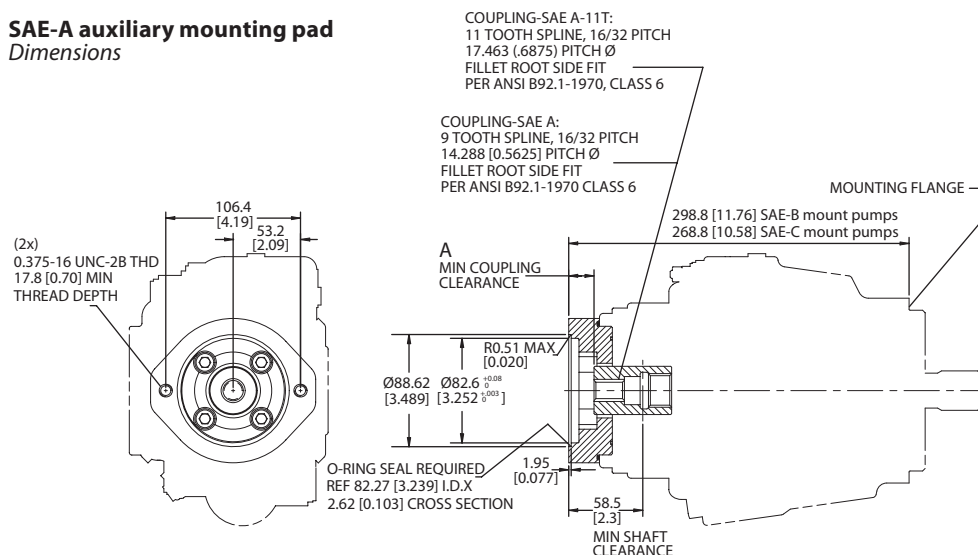
Code	Description	Availability		Torque rating ¹		Drawing
		SAE-C flange	SAE-B flange	Continuous N·m [lbf·in]	Maximum N·m [lbf·in]	
D2	13-tooth 16/32 pitch (ANSI B92.1 1970 - Class 5)	—	●	102 [900]	282 [2495]	20.638 [0.813] PITCH DIA. 13 TEETH, 16/32 PITCH 30° PRESSURE ANGLE FILLET ROOT SIDE FIT COMPATIBLE WITH ANSI B92.1-1970 CLASS 5 ALSO MATES WITH FLAT ROOT SIDE FIT 33.3 [1.31] 18.5 [0.73] MAX 22.13 ± 0.09 [0.87 ± 0.004] 16.7 ± 0.5 [0.66 ± 0.02] 8 ± 0.8 [0.31 ± 0.03] COUPLING MUST NOT PROTRUDE BEYOND THIS POINT P104 030F
D3	15-tooth 16/32 pitch (ANSI B92.1 1970 - Class 5)	—	●	192 [1700]	362 [3200]	23.813 [0.938] PITCH DIA. 15 TEETH, 16/32 PITCH 30° PRESSURE ANGLE FILLET ROOT SIDE FIT COMPATIBLE WITH ANSI B92.1-1970 CLASS 5 ALSO MATES WITH FLAT ROOT SIDE FIT 38 [1.50] 21.84 [0.86] MAX 25.34 ± 0.13 [0.998 ± 0.005] 22.36 ± 0.5 [0.88 ± 0.02] 8 ± 0.8 [0.31 ± 0.03] COUPLING MUST NOT PROTRUDE BEYOND THIS POINT P104 031E

1. See [Input shaft torque ratings](#), page 19 for definitions of continuous and maximum torque.

Auxiliary Mounting Pads

See page 19 for mating pump pilot and spline dimensions.

SAE-A auxiliary mounting pad Dimensions

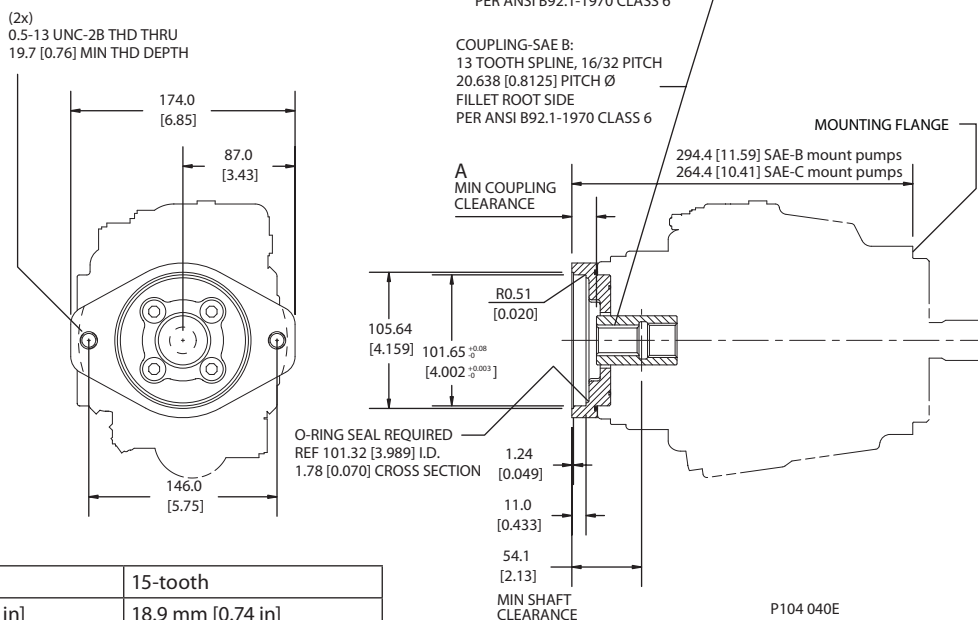


Specifications

Coupling	9-tooth	11-tooth
Spline minimum engagement	13.5 mm [0.53 in]	15 mm [0.59 in]
Continuous torque	51 N·m [450 lbf·in]	90 N·m [800 lbf·in]
Maximum torque	107 N·m [950 lbf·in]	147 N·m [1300 lbf·in]
Dimension A	21.1 mm [0.83 in]	16.1 mm [0.63 in]

SAE-B auxiliary mounting pad Dimensions

See page 19 for mating pump pilot and spline dimensions.



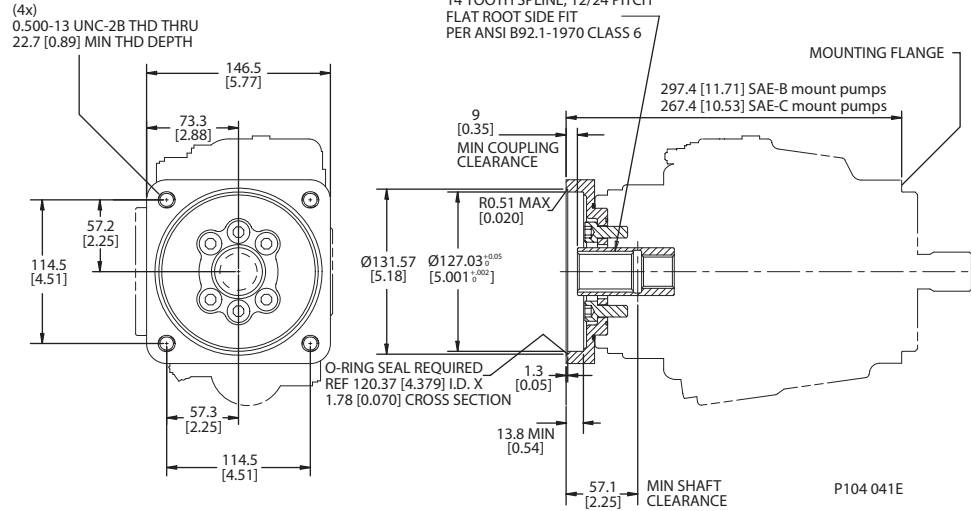
Specifications

Coupling	13-tooth	15-tooth
Spline minimum engagement	14.2 mm [0.56 in]	18.9 mm [0.74 in]
Continuous torque	124 N·m [1100 lbf·in]	235 N·m [2080 lbf·in]
Maximum torque	249 N·m [2200 lbf·in]	339 N·m [3000 lbf·in]
Dimension A	20.7 mm [0.81 in]	12.7 mm [0.5 in]

**Auxiliary Mounting Pads
(continued)**

See page 19 for mating pump pilot and spline dimensions.

**SAE-C auxiliary mounting pad
Dimensions**



Specifications

Coupling	14-tooth
Spline minimum engagement	18.3 mm [0.72 in]
Continuous torque	235 N·m [2080 lbf·in]
Maximum torque	339 N·m [3000 lbf·in]

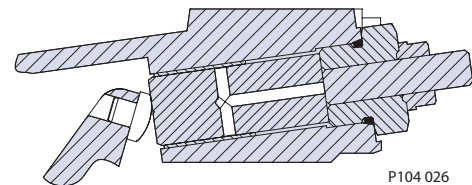
Displacement Limiters

H Frame open circuit pumps are available with an optional adjustable displacement limiter. This adjustable stop limits the pump's maximum displacement.

Setting range

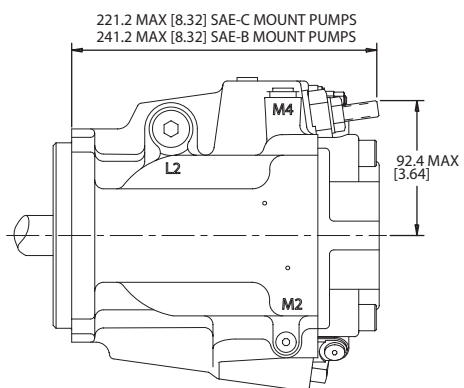
H57B	43 to 57 cm ³ [2.61 to 3.48 in ³]
H75D	56 to 75 cm ³ [3.43 to 4.58 in ³]

Displacement limiter cross-section

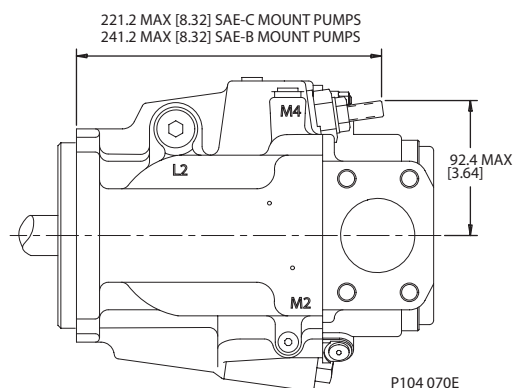


Installation Drawings

Adjustable displacement limiter



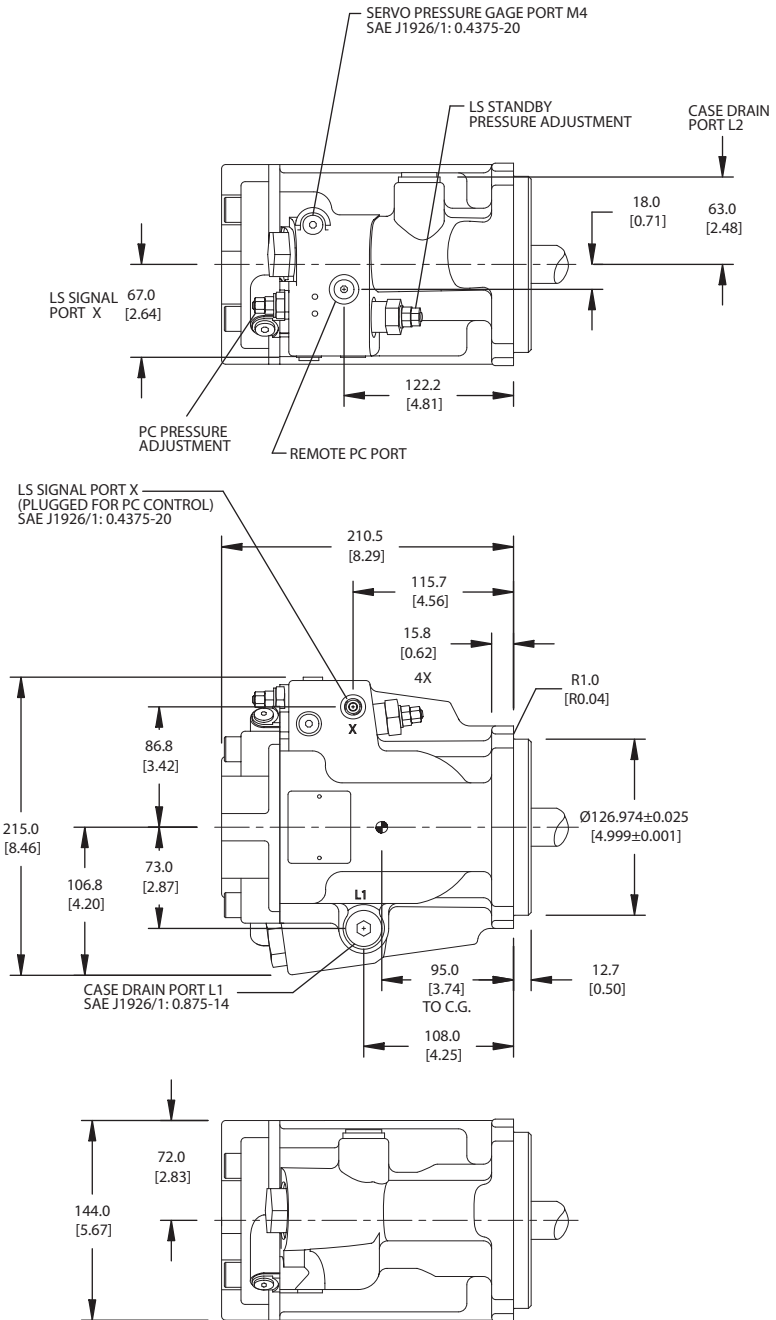
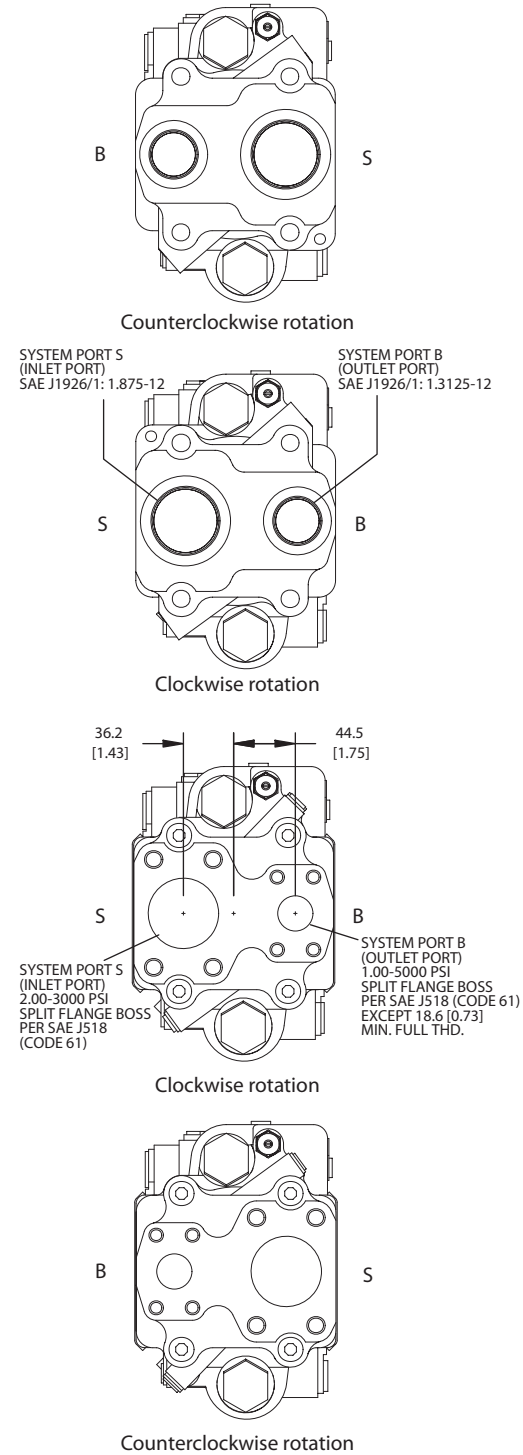
Axial ported units



Radial ported units

Installation Drawings
(continued)

SAE-C mounting flange, axial ported endcap

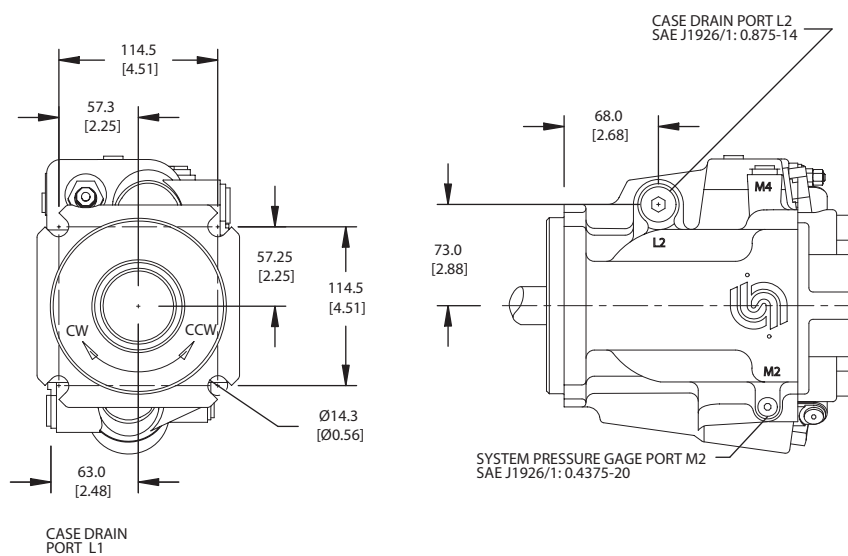


P104 061E



Installation Drawings
(continued)

SAE-C mounting flange, axial ported endcap (continued)

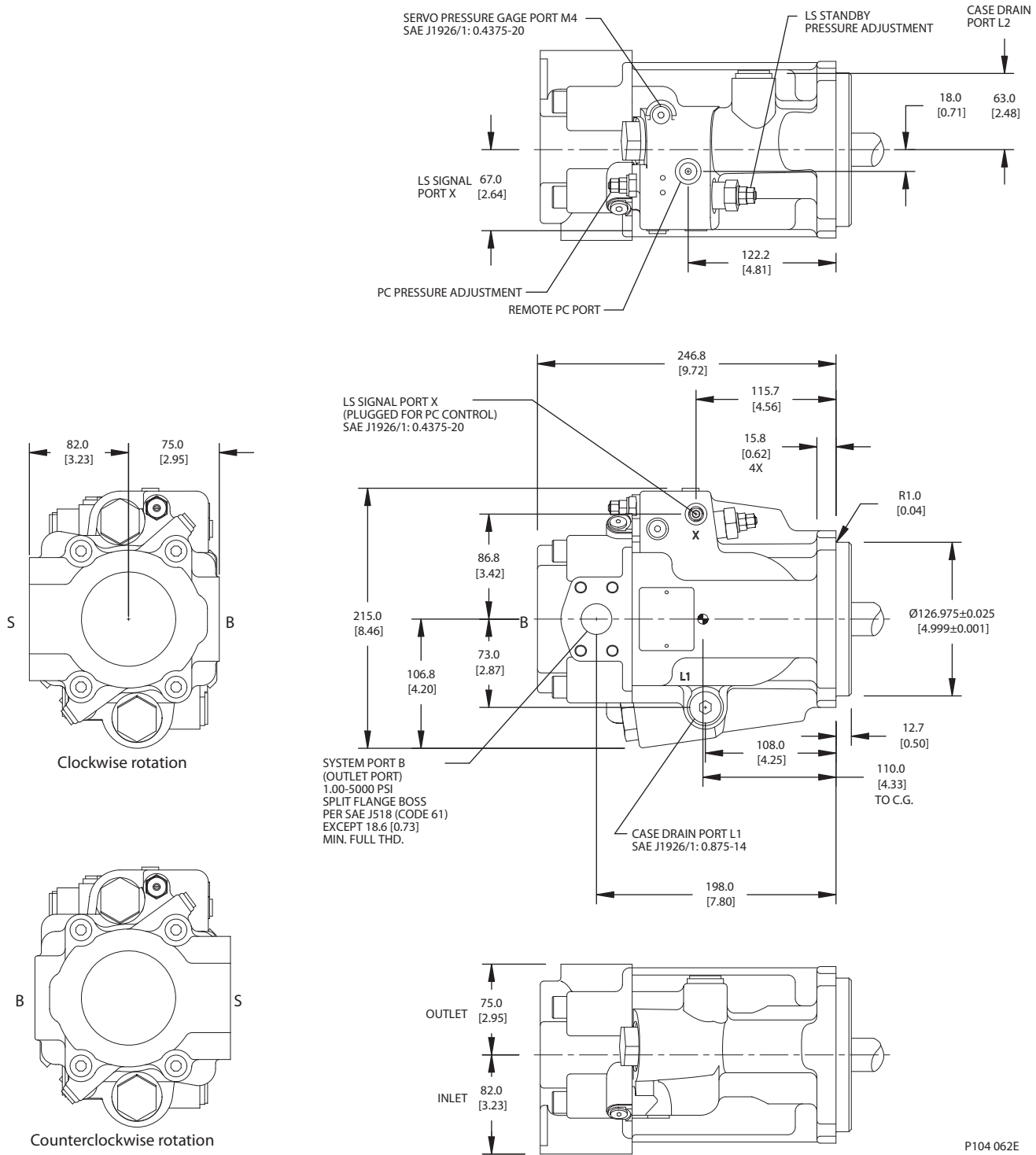


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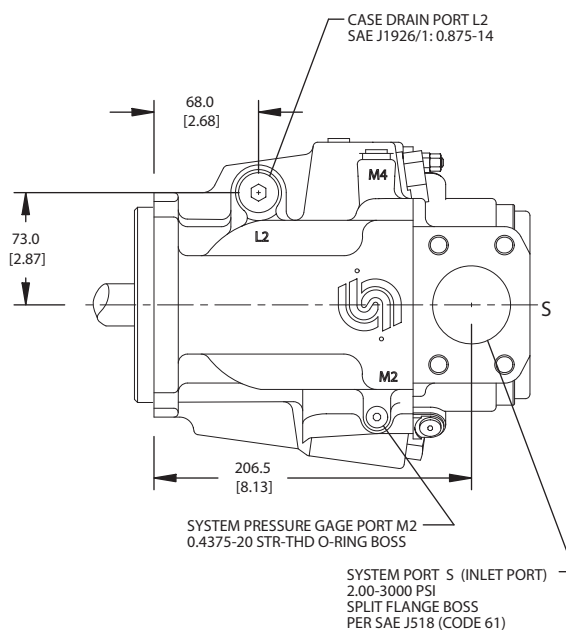
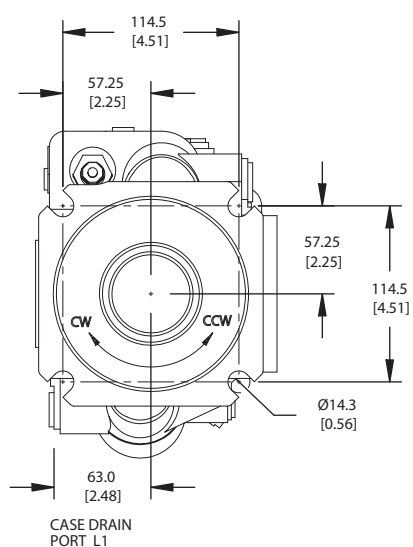
Installation Drawings
(continued)

SAE-C mounting flange, radial ported endcap



Installation Drawings
(continued)

SAE-C mounting flange, radial ported endcap (continued)

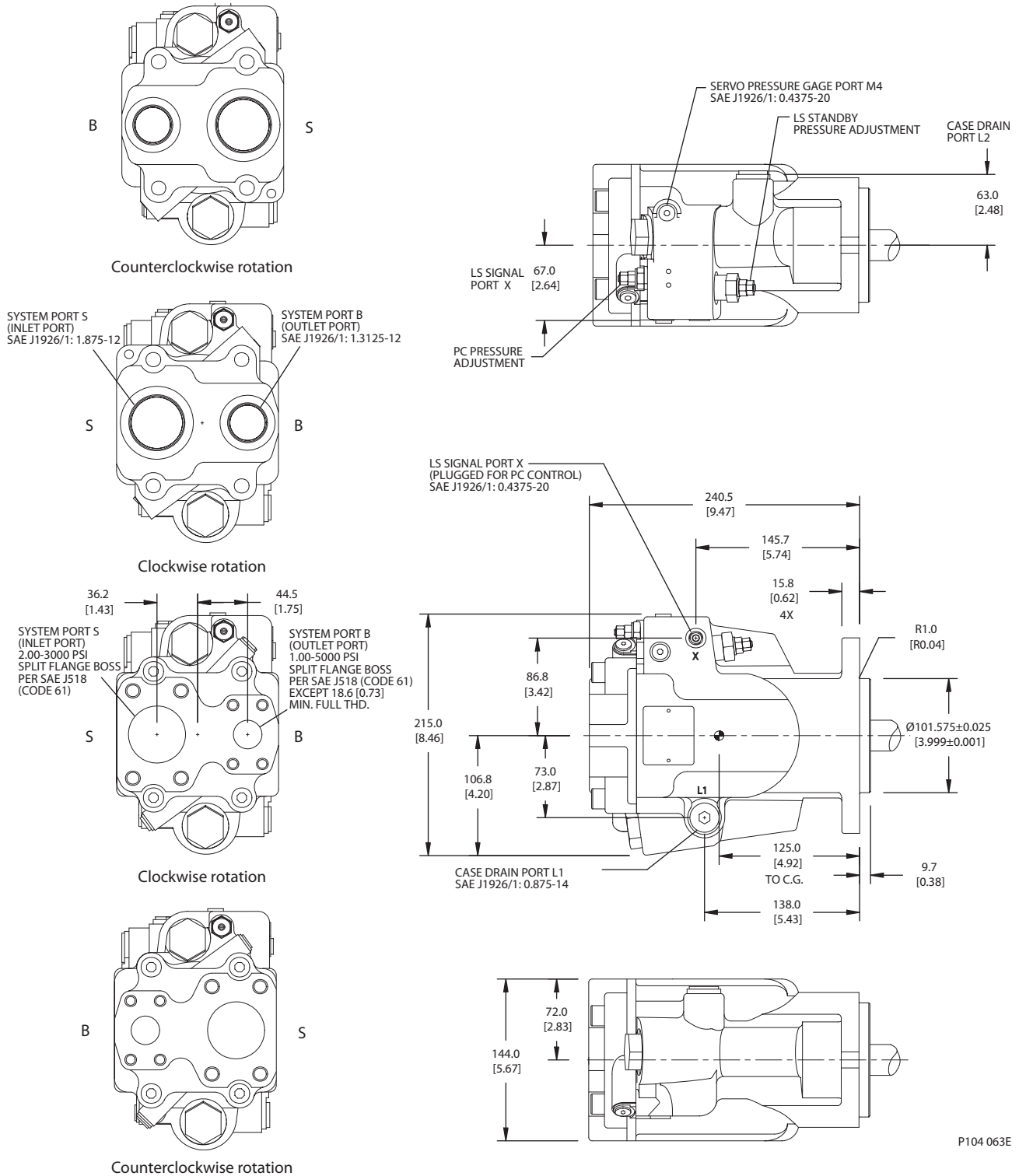


P104 062E



Installation Drawings
(continued)

SAE-B mounting flange, axial ported endcap

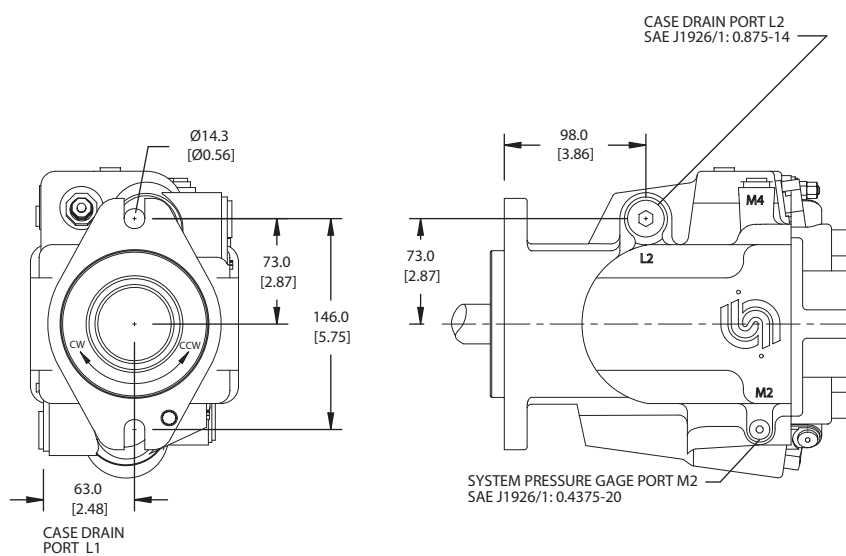


P104 063E



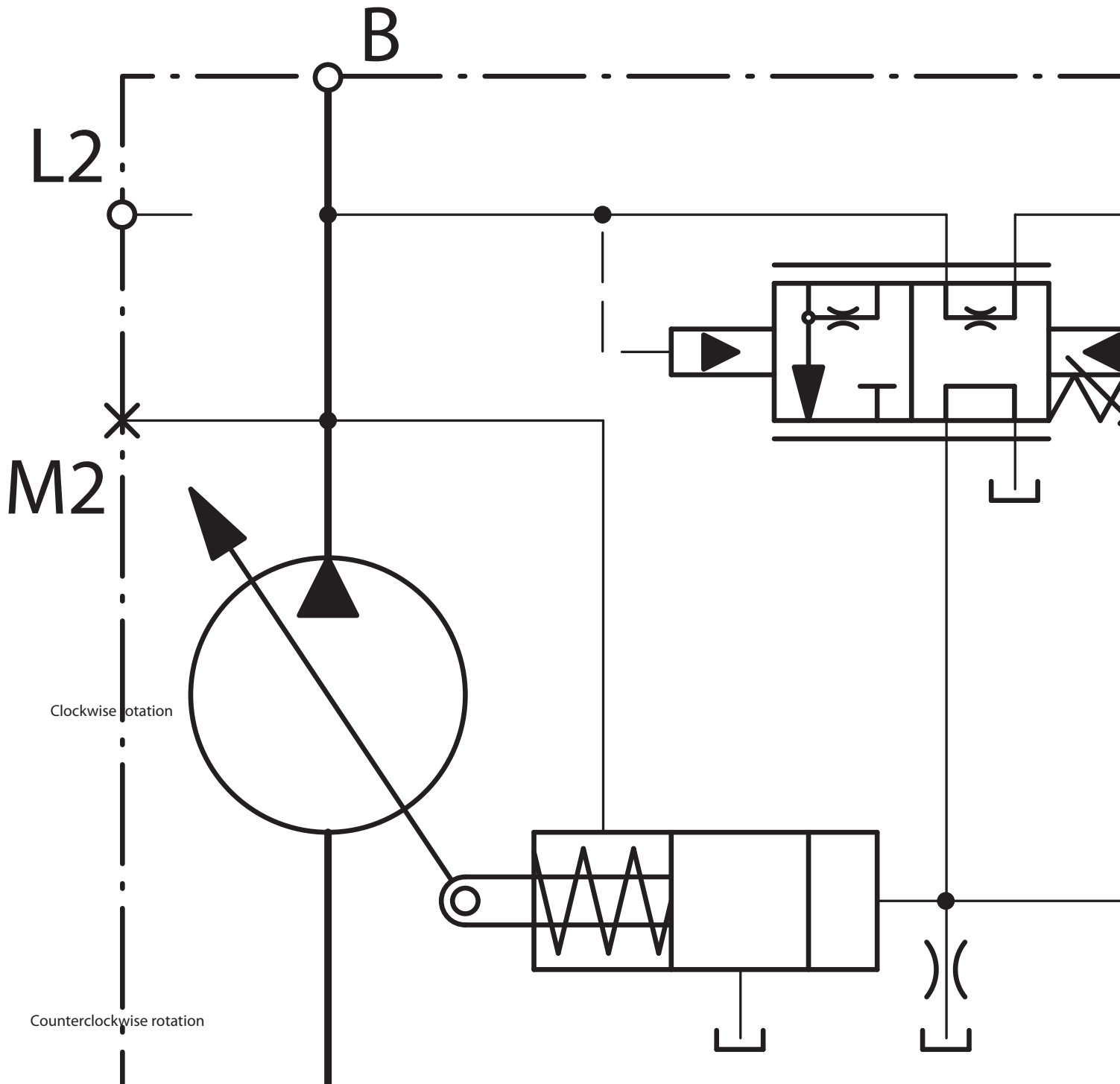
Installation Drawings
(continued)

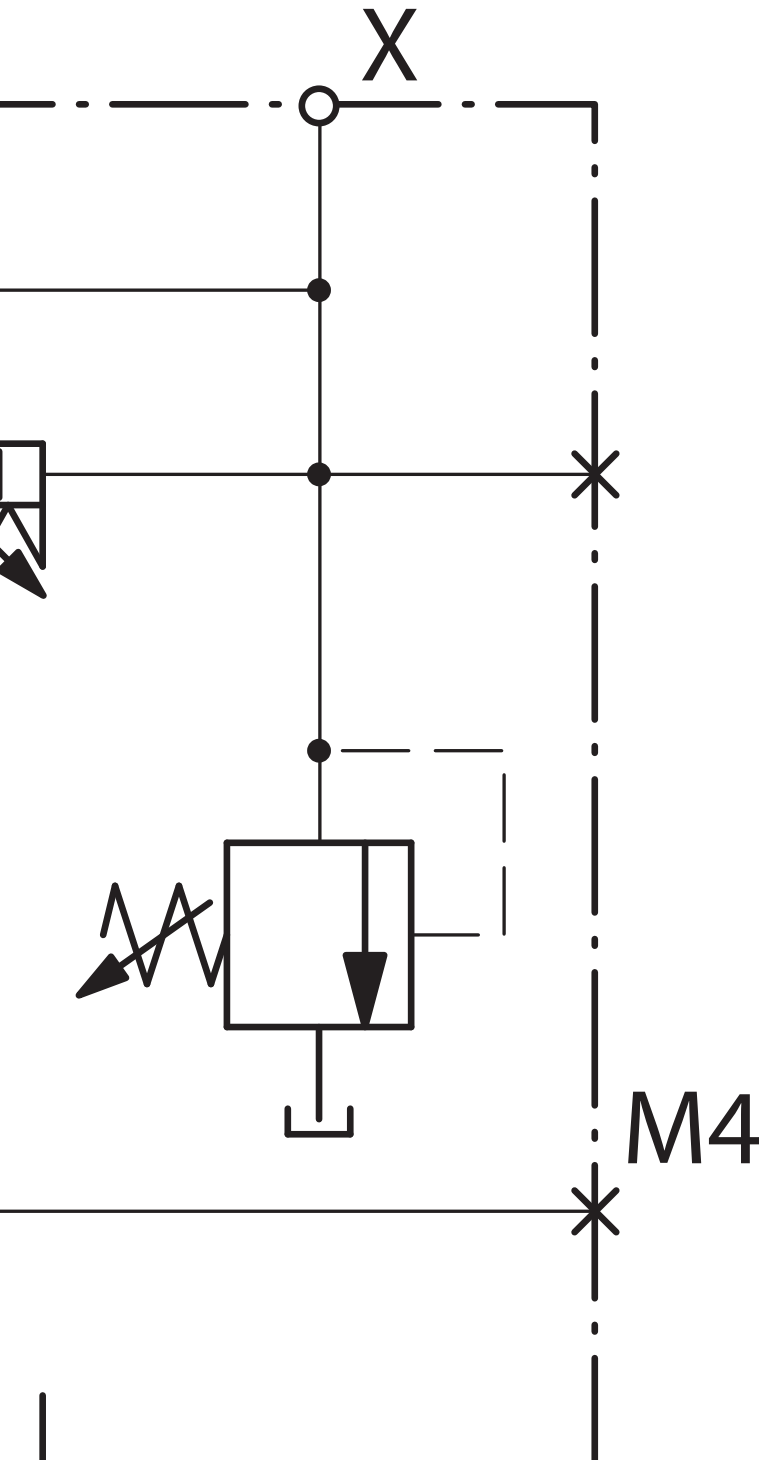
SAE-B mounting flange, axial ported endcap (continued)



P104 063E









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Local address:

Danfoss Power Solutions US Company

2800 East 13th Street
Ames, IA 50010, USA
Phone: +1 515 239 6000

Danfoss Power Solutions GmbH & Co. OHG

Krokamp 35
D-24539 Neumünster, Germany
Phone: +49 4321 871 0

Danfoss Power Solutions ApS

Nordborgvej 81
DK-6430 Nordborg, Denmark
Phone: +45 7488 2222

Danfoss Power Solutions

22F, Block C, Yishan Rd
Shanghai 200233, China
Phone: +86 21 3418 5200

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